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NOTES AND BRIEF ARTICLES

[*Unsigned notes are by the editor*]

Professor Arthur H. Graves, formerly of Yale University, has been called to the Brooklyn Botanic Garden to take charge of the Department of Public Instruction and to devote as much time as possible to mycological work.

Mr. E. J. Butler, Director of the Imperial Bureau of Mycology, Kew, England, who has made a tour of parts of the United States in the interest of pure mycology, visited the Garden on August 18 and sailed shortly afterward for England.

Dr. K. Miyabe, Professor of Botany in the Imperial University at Sapporo, Japan, called at the Garden August 20 and 22 on his return from the Conference of Cereal Diseases held at St. Paul, Minnesota. He sailed from San Francisco September 17, having been in the United States since the first of July.

Dr. E. A. Burt, of the Missouri Botanical Garden, visited the Garden on August 16 to examine certain species of *Clavaria* in the mycological herbarium. He had examined material of this genus at Albany, Cambridge, and elsewhere, and returned to St. Louis by way of New York and Philadelphia.

Mr. A. A. Pearson, Treasurer of the British Mycological Society, visited the Garden early in October before he sailed home to England. He was much interested in our native fungous flora and made several excursions into the woods to collect and study the more conspicuous forms of fleshy and woody fungi.

Dr. G. R. Bisby has applied for leave of absence from the Manitoba Agricultural College at Winnipeg, beginning October, 1921, to accept a position with the British Imperial Bureau of Mycology, of which Dr. E. J. Butler is Director, with headquarters at Kew Gardens, London. The address is 17 Kew Green, Kew, Surrey, England.

A disease of English ivy caused by *Bacterium Hederae* has been studied and described at Paris by Arnaud (Compt. Rend. for 1920). The symptoms are said to resemble those produced on beans in America by *Pseudomonas Phaseoli.*

Isoachlya, a new genus of the Saprolegniaceae, was described by Kauffman in the *American Journal of Botany* for May, 1921. Three species are included, *I. toruloides* Kauffm. & Coker being new and the other two transferred from *Achlya* and *Saprolegnia.*

Professor Buller has recently sent me a reprint of his article, entitled "Die Erzeugung und Befreiung der Sporen bei *Coprinus sterquilinus,*" which was published in the Jahrb. f. Wissensch. Bot. in 1915. It contains 30 pages of text and 2 handsome double plates.

Mr. Weir finds that not only *Thelephora terrestris,* but also *T. fimbriata* and *T. caryophyllea,* are injurious to coniferous seedlings in the Northwest, owing to their habit of growing up about them and strangling them. See *Phytopathology* for March, 1921.

Miss Bessie Etter has published in *Phytopathology* for March, 1921, an article describing the equipment necessary for making successful field cultures of various wood-rotting fungi. Cornmeal agar and malt agar gave the best results for initial inoculations.

Miss Wakefield, the mycologist at Kew, has recently published a paper of 20 pages on the "Fungi of New Caledonia and the Loyalty Islands." She was assisted by Mr. Massee on certain groups and Mr. Cotton named the Clavarias. Eight new species are described.

Plans for the summer field meeting of cereal pathologists, July 19–22, at University Farm, St. Paul, Minnesota, included excursions to grain fields, elevators and mills in the vicinity of Minneapolis and Fargo. A number of foreign plant pathologists were in attendance.

Professor Massey, of Cornell University, has found by an experiment covering a period of three years that crown canker, *Cylindrocladium scoparium* Morg., causes a loss in the case of Ophelia roses grown under glass of about ten blossoms, or one dollar, per plant. See *Phytopathology* for March, 1921.

Barlot has experimented with various chemicals for color reactions to distinguish poisonous and non-poisonous species of *Amanita* (Compt. Rend. **170**: 679–681. 1920). For example, he found that three deadly species turned black when treated with drops of fresh blood to which potassium ferrocyanide had been added.

A paper by Saccardo, entitled "Mycetes Boreali-Americani," which appeared in the *Nuovo Giornale Botanico Italiano* for 1920, includes notes on 98 species of fungi sent by Weir from the Northwest for determination. Thirty of these species were described as new, most of them in the groups with which Saccardo was familiar.

Investigations of *Cronartium ribicola* in 1920 by Pennington and others brought out two very important points: that species of *Ribes* are often killed by intensive outbreaks of the fungus in a definite area, and that the aeciospores may be blown an indefinite number of miles and cause new infections on *Ribes*. See *Phytopathology* for April, 1921.

A glume blotch of wheat, caused by *Septoria nodorum* Berk., has been under observation for three seasons about Fayetteville, Arkansas, and Mr. H. R. Rosen has now published an account of it in Bulletin 175 of the Arkansas Agricultural Experiment Station. He considers it next in importance to leaf rust as a disease of wheat in Arkansas.

Povah has studied poplar canker, caused by *Cytospora chrysosperma,* in an area near Syracuse, New York, where the trees were weakened by fire, and he finds that in this area 68 per cent. of the poplars were infected and over 30 per cent. killed. Three species of poplars were observed and subjected to inoculation experiments. See *Phytopathology* for April, 1921.

A long illustrated paper on "Cultural Studies of Species of *Actinomyces,*" by S. A. Waksman, appeared in *Soil Science* for August, 1919. This is a notable contribution to our knowledge of soil organisms, the importance of which is being more and more recognized. The paper contains a key to the species of *Actinomyces* based chiefly on biochemical characters.

Mr. Paul C. Standley has called my attention to an article by Hans Schinz, entitled "Der Pilzmarkt der Stadt Zürich der Jahre 1918 und 1919 im Lichte der städtischen Kontrolle," published in Vierteljahr. Naturf. Gesell. Zürich, vol. 56, p. 530. The control of mushroom markets must come in this country as soon as wild mushrooms are offered for sale in any quantity.

A dangerous tobacco disease has appeared in the southern United States, according to Smith and McKenney, apparently due to *Peronospora Hyoscyami,* which was originally described by DeBary from the black nightshade of Europe. This downy mildew attacks the tobacco seedlings in the plant beds, causing great havoc. In Florida, Bordeaux has proven more effective than in Australia, but spraying experiments are still incomplete.

Entoloma albidum Murrill, a species originally described from Stockbridge, Massachusetts, is reported by Dr. H. D. House as the cause of violent illness when eaten by a family of five in Albany late in August, 1921. Specimens were submitted to me for identification. *Entoloma lividum,* of Europe, is dangerously poisonous, and American species of this genus are naturally under suspicion, but few of them have been tested.

"The Fungi of Our Common Nuts and Pits" is the title of an interesting and important paper recently contributed by Dr. C. E. Fairman to the *Proceedings of the Rochester Academy of Science.* Both saprophytic and parasitic fungi are included among the hundred or more species listed. About thirty species and one genus are described as new. The six plates are unfortunately rather poor, but doubtless serve their purpose.

Silver-leaf disease, caused by *Stereum purpureum,* occurs on a variety of trees and shrubs in England, the hyphae of the fungus being always present in the stem and roots of plants that are attacked, but never in the leaves. Infection takes place through wounds. There is a false silver-leaf disease, apparently not due to fungous attack, which must be carefully distinguished. See Bintner in *Kew Bull. Misc.* for 1919.

I am sending under separate cover some specimens of *Calostoma Ravenelii* which I collected on my farm near Conway, Kentucky. The plants were growing in a clay bank along a wooded roadside where the soil had been disturbed within a year or two. The farm lies between the blue grass and the foothills. I had never seen a *Calostoma* before and was wonderfully interested in the find. The collection was made September 6, 1921.—*Bruce Fink.*

A fine specimen of what appears to be the rare *Stereum petalodes* Berk. has recently come in from Las Ninfas, Cuba, collected there by Brother Hioram in midwinter. Professor Burt, to whom a part of the specimen was sent, writes me: "I presume it must be this species, as you determined. I have not seen the authentic specimen of this species at Kew, but should I ever cross the water again I have noted this specimen for comparison with the original."

The correspondence of Schweinitz and Torrey, the two dominating figures in American botany during the early part of the nineteenth century, has been collected and published by C. L. Shear and N. E. Stevens as a memoir of the Torrey Botanical Club, dated July 16, 1921. There is also included a list of the publications cited, prepared by Florence P. Smith, and biographical notices of persons mentioned in the correspondence, contributed by J. H. Barnhart.

A new leaf-spot of the so-called Egyptian lotus caused by *Alternaria Nelumbii* is described and figured by Enlows and Rand in *Phytopathology* for March, 1921. It appears as very small, smooth, reddish-brown flecks, which increase to a diameter of 5–10 mm. No perfect stage was discovered, but the conidial stage appears to possess great longevity. This disease was first observed by Rand in 1913 at Kenilworth, D. C., and at the New York Botanical Garden.

In Department Circular 177 of the U. S. Department of Agriculture, prepared by Martin and others, a method of treatment is outlined for ornamental pines affected by blister-rust. It is claimed that "infected ornamental pines can be saved by properly cutting out the diseased parts, if the work is done in time. The best results will be obtained in the spring, and success depends upon finding and completely removing the cankers. Tree surgery of this kind can be performed by the owner at small cost."

Farmers' Bulletin 1187 of the U. S. Department of Agriculture, by W. W. Gilbert, deals in a popular way with the chief diseases of cotton and their control. Wilt, caused by *Fusarium vasinfectum*, is controlled by the use of resistant varieties and crop rotation. Anthracnose, due to *Gloeosporium Gossypii*, also requires rotation and resistant varieties, care being taken to use only perfectly healthy seed. Bacterial blight requires the same treatment as anthracnose. Other minor fungous diseases are also described in this bulletin.

A new budrot disease of Cannas due to *Bacterium Cannae* is described and figured by Mary K. Bryan in the *Journal of Agricultural Research* for May 2, 1921. Infection takes place through the stomata and spreads through the intercellular spaces of the parenchyma of leaf-blade, petiole and stalk. The disease is most destructive early in the season, that is, on young plants. It begins in the hothouse and continues in the open beds. It destroys the buds, forms large unsightly spots on the leaves and ruins the blossom clusters by blighting the flower buds or by decaying the stalk. No means of control has yet been worked out.

I received from Dr. Overholts last August a fresh specimen of *Poria semitincta* which was colored a beautiful, delicate lilac (*lilacinus*) on the margin for a centimeter or more, while the hymenium was entirely white or with dirty pale-yellowish-white stains. The following note accompanied the specimens:

"I am sending you under separate cover a fresh specimen of *Poria semitincta* Peck. I do not know how familiar you may be with the fresh coloration in good specimens of this species, and it is worth seeing. The color gradually fades in herbarium specimens, and a collection of October, 1919, with colors as in this specimen has now almost faded out. This is my fourth collection, and I have had it twice from correspondents.'

An excellent professional paper of one hundred pages on "Damping-off in Forest Nurseries," by Carl Hartley, appeared last June as Bulletin 934 of the U. S. Department of Agriculture. Damping-off in nurseries is caused mainly by seedling parasites which are not specialized as to host; *Pythium Debaryanum* and *Corticium vagum* are probably the most important of these. The most serious losses in conifers are ordinarily from the root-rot type of damping-off, occurring soon after the seedlings appear above ground and while the hypocotyls are still soft. The best control method appears to be the disinfectant treatment of the seedbed soil before or immediately after the seed is sown. Sulphuric acid has been found very useful for conifers, as they are apparently especially tolerant of acid treatment. Broad-leaved tree seedlings rarely suffer seriously from the attacks of damping-off fungi.

The British Mycological Society is interested in a collection of type cultures to be assembled and maintained at the Lister Institute, Chelsea Gardens, London. It is proposed to collect and maintain cultures of fungi of importance in phytopathology, medicine, veterinary science, technology and soil biology, types useful for teaching purposes and any rare or interesting species. The coöperation of bacteriologists and mycologists is earnestly invited, and in return every effort will be made to supply the needs of applicants for cultures. In the case of fungi it is necessary at present to restrict the collection to fully identified species. Cultures will be supplied on demand, so far as possible, to workers at home and abroad, and, as a rule, a small charge will be made to defray the cost of media and postage. Annual lists of the fungi in the collection will be published in the Transactions of the British Mycological Society.

The *Journal of Agricultural Research* for April 15, 1921, contains an important illustrated article by Annie May Hurd on seed-coat injury and viability of seeds of wheat and barley as factors in susceptibility to molds and fungicides. An unbroken seed coat ordinarily affords absolute protection against attack of living seeds by *Penicillium* or *Rhizopus,* while the location of a break in the seed coat determines the ability of these and other saprophytic fungi to invade seeds, either in the soil or in storage. If the injury is over the endosperm, 100 per cent. fatal infection results when the spores of *Penicillium* or *Rhizopus* are present; but if it is over the embryo, the seeds remain practically immune. The vitality of seeds is also a factor in determining the ability of *Penicillium* and *Rhizopus* to attack them. The damage that will be done to seed wheat by the copper-sulphate treatment for smut and by saprophytic fungi can be predicted by examination of the physical condition of the seed. All these troubles can be reduced by greater care in threshing the seed wheat so that the seed coats are not so badly broken.

According to Korstian and others in the *Journal of Agricultural Research* for May 2, 1921, chlorosis has been the most serious problem encountered in the successful production of coniferous nursery stock at a nursery in southern Idaho. The disease affects all coniferous species grown in this nursery. With chlorosis were associated poor growth of roots, stems and leaves, failure to form normal terminal buds, and susceptibility to winter injury.

Chlorosis in western yellow pine at the Pocatello Nursery has been definitely corrected by spraying with ferrous sulphate at 10-day intervals. Similar, though less decisive, results were obtained with Douglas fir. A one per cent. solution in amounts sufficient to wet the tops thoroughly proved the most satisfactory treatment. A two per cent. solution ultimately caused chemical injury to practically all the plants. In a region of more frequent rains the stronger solution might be better.

The control of chlorosis in jack pine and western yellow pine at the Morton Nursery in Nebraska by spraying with a one per cent. solution of ferrous sulphate has given such evidence of success that it has been adopted as a part of the regular nursery practice.

"The Relation of Plant Pathology to Human Welfare" was presented by F. L. Stevens as an invitation paper at the Chicago meeting last winter and published in the *American Journal of Botany* for June, 1921. The author deals in a very interesting and convincing way with some of the achievements of plant pathology, as well as with some of the problems still to be solved. The following extracts may awaken interest and lead to a careful perusal of the entire paper:

The magnitude of the annual loss incurred in the United States alone through plant disease in diminution of yield and loss of produce is far greater than it is generally conceived to be. In 1919 the total loss with fifteen principal food products is estimated at nearly a billion and a half dollars. Among the late continental arrivals is the pine blister rust, which is under such headway that it seems to be impossible of extermination. The value of the susceptible pines is such that the loss may readily reach a hundred million dollars. The chestnut-bark disease caused a loss of $25,000,000 from 1904 to 1911. Much more serious is the loss to be borne as it invades the great chestnut forests of the Appalachians Citrus canker, imported from Japan about 1910–11, bids fair to ruin large industries. As increased long-distance communication gives intercontinental transport to disease, so congestion of crop population creates a bridge by which the casual organism may more readily pass from plant to plant or from farm to farm. In these two conditions, facility of transportation and congestion of crop, we find, to a large degree, explanation of the fact that plant diseases are more prevalent now than formerly.

What is the nature of the return that plant pathology has given? The achievements may be summarized briefly as falling within seven great categories demonstrating the value of: protective applications, sprays and dusts; excision; seed steeps; general sanitation leading to diminution of infective material; breeding for disease resistance; modifications of agricultural practice; quarantine restrictions. Of all the categories mentioned, perhaps the least dependent upon science and the most empirical is that relative to disease resistance, since some of our most valuable resistant varieties have been given to us by farmers, while many of the most susceptible have been eliminated naturally. During recent years, however, knowledge of Mendelism and of biologic specialization has added a very important, truly scientific aspect to this somewhat empirical subject.

It is to be observed that the great discovery of the parasitism of the fungi and the founding of bacteriology and the development of its methodology, together with the early foundations laid through the years in histology, mycology, taxonomy and physiology, have furnished the bases on which plant pathology has made its advance. Aside from these there have been few, if any, great fundamental contributions. The problems of disease resistance and wherein it lies are obviously important. Enzymes and toxins will repay much study. That group of mysterious diseases including the mosaics and peach yellows holds a secret the discovery of which may well be revolutionary in pathology. But since the problems now before us are more intricate than those of the past generation, they demand concentration, larger breadth of equipment, longer periods of sustained research on a given problem, in a word, greater specialization, and this often needs to be accompanied by coöperation of widely separated branches of science or of distinct sciences.

In Research Bulletin 48 of the Agricultural Experiment Station of the University of Wisconsin, devoted to Fusarium Resistant Cabbage, Professor Jones and his co-workers summarize the present status of this important series of investigations as follows:

"It is evident that individual variation in degree of susceptibility or resistance to Fusarium has been found to occur with every variety of cabbage tested on 'yellows sick' soil. Experience to date justifies our confidence that this resistance is due to heritable differences and that, therefore, through the selection of such resistant heads from 'sick' soil, a Fusarium-resistant strain may be secured of any of the standard cabbage varieties. Our experience indicates, moreover, that through careful and repeated selection this resistance may be combined with any of the other desired qualities of the standard commercial varieties, such as season of maturity, length of stem, tenderness of leaf, shape and compactness of head. In other words, resistance does not seem to be incompatible with any other of the commonly recognized variables of the cabbage. All our experience indicates that Tisdale's conclusions relative to the flax wilt hold true for the cabbage, that resistance is probably determined by multiple factors. The degree of resistance is, therefore, due to the combination of these, and in all cases in our experience it is partial or relative, not absolute. Moreover, this explanation is consistent with our experience that after proceeding to a certain stage with our present methods of selection little or no further progress as to disease resistance is made. This is also consistent with our general experience that the best results have in each case been secured through growing a selected head in isolation and thus securing seed through self-pollination, but that when the benefits were once secured in this way with our best selections mass culture has been followed to advantage.

"Our plan of procedure, justified alike by theory and practice, is as follows. After securing a strain showing a satisfactory degree of resistance, combined with the other desired characteristics, we release it for commercial distribution. Thereafter our interest is primarily confined to such coöperation as is required for the maintenance of these essential standards. To this end we continue to grow each year a few hundred plants of each of these types in trial rows on soil that is 'sick,' *i.e.*, thoroughly infested with the cabbage Fusarium. From these plants further selections are made with the aim of maintaining the best standards both as to type and disease resistance. Of course, there is opportunity for minor gains in this way, but our experience has not indicated that much improvement is to be expected in this direction. The surplus seed thus obtained is placed in the hands of the local cabbage growers' committee for commercial increase in such manner as will best maintain general standards of excellence."

REVIEW OF KLEBAHN ON LIFE HISTORIES OF ASCOMYCETES

Haupt-und Nebenfruchtformen der Askomyzeten. Eine Darstellung eigener und der in der Literatur niedergelegten Beobachtungen über die Zusammenhänge zwischen Schlauchfruchten und Konidienfruchtformen, von Heinrich Klebahn. Erster Teil Eigene Untersuchungen, Leipsig, Verlag von Gebrüder Borntraeger, 8, 1918, pp. 395. text figs. 275.

This is one of the papers prepared for the memorial volume to Dr. Ernst Stahl in celebration of his seventieth birthday. The author is already well known for his investigations of the life histories of ascomycetes as well as rusts.

As an introduction, previous work on this subject from the Tulasne Brothers and Fuckel down is briefly reviewed. The life histories of the fungi covered in this part of the work, including about 40 species and varieties, mostly pyrenomycetes, have been determined or verified by the author. The second part, which is promised later, is to cover similar work of other investigators on this subject. This work will be of great value to all mycologists and pathologists, as the various papers which have been published on life history studies are much scattered and frequently inaccessible to students and sometimes to investigators. Most of the life histories reported are based upon pure cultures from ascospores. In many cases inoculation experiments were also made. The genus *Mycosphaerella* is taken up first and the life histories of 7 species, occurring on various hosts, are described. In some of the species *Septoria* was found to be the pycnidial stage; in others the form produced was *Phleospora*. The author suggests that the form genera *Septoria* and *Phleospora,* though separate, are very closely related, and hence keeps their ascogenous forms together. In certain other species of *Mycosphaerella,* as *M. punctiformis, M. Fragariae* and *M. maculiformis, Ramularia* is shown to be the conidial form; while in other species, as *M. cerasella,* a *Cercospora* is produced. The author concludes, therefore, that in spite of the morphological similarity of the ascogenous forms of the various species of *Mycosphaerella* they are no more closely related than their corresponding lower spore forms. *Cercospora* is said by the author to be closely related to *Ramularia,* but is considered distinct in lacking chains of conidia and in the color of the mycelium when young. In culture *Cercospora* is said to be strikingly different from *Ramularia.* On account of these differences in the lower forms found in the species of *Mycosphaerella* studied, three new generic names are proposed: *Septorisphaerella, Ramularisphaerella* and *Cercosphaerella.*

This is an innovation in nomenclature which needs serious consideration. The purpose of these compound names is evidently to suggest at once the life history of the fungus by combining the names of the perfect and imperfect stages. In the first place this plan seems to set aside all claims of priority for previous generic names and apparently proposes the substitution of entirely new names for genera as fast as their life histories are known. This alone is a radical departure from established usage. It would also lead to frequent violation of the rule against sesquipedalian names. To be consistent in the application of this method it would be necessary to combine the names of the various form genera in cases where 3 or 4 spore stages or form genera are known to belong to the life history of a single organism. The combination of so many different generic names in one would evidently be impracticable. Supposing, however, that the plan were feasible; in the present state of uncertainty as to the types of genera and the application of generic names such combinations would be uncertain in their significance and would not mean the same thing to different mycologists. The reviewer is forced to conclude, therefore, that however laudable the author's purpose in adopting these new names, there is much more to be said against the plan than for it.

Another fact might well be considered in this connection. The author recognizes that there are species of *Mycosphaerella* which have been found to have *Ascochyta* or *Diplodina* and *Cylindrosporium* as lower spore forms, and he also finds *Phyllosticta* pycnidia present in species of his *Septorisphaerella* and *Ramularisphaerella*. The experience of the reviewer has shown that in *Glomerella, Melanops* and other ascomycetes the same species will sometimes produce one form of conidial or pycnidial fructification and at other times another form, and occasionally two or three forms in succession in a single culture. It appears, therefore, that, in pure cultures from single ascospores, there is at present no certainty of securing all the spore forms belonging to the life history of the organism in a single culture, or in a few cultures. Sometimes no lower spore form is obtained, as the author indicates in some of his species, and he concludes as a result that the species possesses no such form. He cites in support of this conclusion the fact that in closely related rusts certain spore forms are lacking, whereas in others they are present. Evidence of this sort is entirely untrustworthy in the reviewer's opinion. It seems much more reasonable to expect that, if at one time we obtain a *Ramularia* or *Cercospora* and at another time, from the same or a very similar species, obtain a *Septoria* or *Phleospora,* both the conidial and pycnidial form may belong to both species; but for some unknown reason have not both developed in either case. Potebnia, a former worker in Klebahn's laboratory, also expresses this view in discussing *Mycosphaerella cerasella,* in which only a *Cercospora* type was produced. He says that by analogy we must assume the existence of the *Phleospora-Septoria* type in this species also. The reviewer has demonstrated (in MSS.) that such cases occur in *Melanops,* where in one series of cultures from ascospores only a *Dothiorella* is produced and in another series from the same species, so far as can be determined by morphological characters, and from the same host, only a *Sphaeropsis* or *Diplodia* spore form is produced.

It is a notorious fact that ascocarps are rarely produced in culture when the conidiospores or pycnospores are used as a starting point; but one would scarcely feel justified in concluding from this that all of the forms behaving in this way are autonomous and have no ascospore stage. Until we know vastly more about the factors which determine the sequence and development of the various spore forms, it is futile to predict that, when cultures from ascospores produce ascocarps directly, the species lack lower forms; or that, when they produce pycnidia or conidia, this is the only lower spore form they possess.

The author very aptly remarks that there are many unknown factors yet to be determined in regard to the behavior of these organisms under cultural conditions.

The life histories of various species of *Gnomonia* follow, the author including under this genus what have been called *Ophiognomonia, Gnomoniella, Linospora* and *Hypospila.* The conidial forms of most of these species are referred to the form genera *Gloeosporium, Marssonina, Asteroma* and *Leptothyrium.* The only conclusion he is able to draw from the great variety of lower spore forms obtained is that, if the various intermediate states which occur between conidial and pycnidial fructifications are recognized, it may be said that the lower forms of *Gnomonia* all belong to the Melanconiaceae.

It seems evident that much more study and comparison of the morphological characters and the correlation of further life history studies are needed in order to determine the generic and specific relationships of the species and genera discussed.

In conclusion the author discusses and illustrates the life histories of several discomycetes, including *Entomopeziza Soraueri, Pseudopeziza ribis, P. Populi-albae* and *P. salicis.* As a result he concludes that species of *Gloeosporium, Marssonina* and *Entomosporium* are conidial conditions of these fungi, and that also species of *Gloeosporium, Marssonina* and similar fungi belong to species of *Gnomonia.* He, therefore, is of the opinion that the relation between these discomycetes and the pyrenomycetes mentioned is very close.

The reviewer believes, however, that this relation is not nearly so close as suggested, and that the author's conclusion is perhaps due to a misinterpretation of the form genera mentioned. *Gloeosporium,* for example, as used by Saccardo and others, includes a most heterogeneous group of spore forms having only the most superficial and general characters in common, and the large number of so-called species when carefully studied morphologically and in culture are found to consist of very different organisms which should be placed in very different genera on the basis of a thorough knowledge of their morphological characters alone.

The author expresses the belief, however, that an improvement of the present taxonomy of the imperfect fungi can only be expected when their connection with their perfect stages is known. The phytopathological importance of such knowledge is also indicated, as the ascogenous form found on dead plant parts, and hence usually regarded as a saprophyte, may carry the parasite over winter and be the source of new and unsuspected infections in the spring.

As to which was the primitive spore form, he says: "Little is known as to whether the original form of fructification was ascogenous or conidial." Brefeld's views regarding the relation of asci to sporangia he does not consider tenable in the light of our present knowledge. The evidence thus far accumulated by the author and others would seem to justify the belief that further studies of the life histories of the ascomycetes and of the morphological and cultural characters of the various spore forms or stages will furnish most important clues to the taxonomy and phylogeny of this great group of fungi and make it possible to present a more natural system of classification than we have at present.

The numerous clear text figures given are indispensable in interpreting the work and getting exact ideas of the forms discussed. The text is less involved and more easily read than that of many German scientific writers. It is to be hoped that the author will continue these valuable studies and that the second part of the work may soon appear.

C. L. SHEAR